D.) AMENDMENTS TO THE DRAWINGS

None.

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E.) REMARKS

This Response is filed in response to the Office Action dated September 7, 2005.

Upon entry of this Response, claims 1-23 will be pending in the Application.

In the outstanding Office Action, the Examiner rejected claims 1-17 under 35 U.S.C. 102(b) as being anticipated by Mukai et al. (U.S. Patent No. 5,010,287); and rejected claims 18-23 under 35 U.S.C. 103(a) as being unpatentable over Mukai et al (U.S. Patent No. 5,010,287) in view of Norbeck (U.S. Patent No. 4,259,845).

Rejection under 35 U.S.C. 102

The Examiner rejected claims 1-17 under 35 U.S.C. § 102(b) as being anticipated by Mukai et al. (U.S. Patent No. 5,010,287), hereafter referred to as "Mukai."

Specifically, the Examiner stated that

> Regarding Claims 1, 2, 8, 15 and 17. Mukai discloses an induction motor control system that provides an induction motor (Figures 1 and 3 item 5) having a predetermined rated operational voltage and frequency, wherein the predetermined rated operational voltage and frequency of the motor provides a predetermined output horsepower (abstract), a converter/rectifier (Figures 1 and 3 item 1) and a DC link (Figures 1 and 3 item 3); providing a variable speed drive (Figure 1 item 20 and Figure 3 items 10 and 20) capable of outputting a voltage and frequency greater than the predetermined rated operational voltage and frequency of the motor (abstract; column 6 lines 24-68 and column 7 lines 1-68) and connecting the variable speed drive to the induction motor to provide power to the induction motor (Figures 1 and 3 item 5); and operating the variable speed drive to provide an output voltage and frequency to the induction motor greater than the predetermined rated operational voltage and frequency of the induction motor, wherein powering the induction motor at an output voltage and frequency greater than the predetermined rated operational voltage and frequency results in the motor generating an output horsepower greater than the predetermined output horsepower (abstract; column 6 lines 24-68, column 7 lines 1-68 and column 9 lines 5-32).

Applicants respectfully traverse the rejection of claims 1-17 under 35 U.S.C. § 102(b).

Mukai, as understood, is directed to an improved induction motor control system with a variable speed drive composed of a passive diode rectifier, a DC link capacitor and an inverter. The inverter supplies a variable frequency AC voltage to drive the induction motor and the control system. The control system detects the power factor phase angle between the motor

current and the inverter output voltage to determine the amount of load imposed on the motor. The detected phase angle is then compared to a predetermined phase angle, which is a frequency dependant angle indicative of a standard load at a given frequency. This comparison enables the system to provide a control output in response to which the inverter output voltage is altered out of the predetermined relationship with the frequency in order to compensate for undesirable stator resistance within the motor to improve motor efficiency. The frequency dependant phase angle can be used to compensate for a significant phase shifting of the motor current in relation to the inverter output voltage as seen in the low frequency range to obtain a correct index of the load imposed by comparison with the detected phase angle. The inverter control in Mukai that adjusts the output volts/Hz ratio may result in a significant drop of output torque available from the motor at lower operating speeds, and may also result in a lower operating efficiency for the entire range of operation at any speed.

In contrast, independent claims 1 and 8 are directed to a method and system for increasing the output horsepower of an induction motor. Claim 1 includes a method for increasing the output horsepower of an induction motor, the method comprising the steps of providing an induction motor having a predetermined rated operational voltage and frequency, wherein the predetermined operational voltage and frequency of the motor provides a predetermined output horsepower; providing a variable speed drive capable of outputting a voltage and frequency greater than the predetermined rated operational voltage and frequency of the motor; connecting the variable speed drive to the induction motor to provide power to the induction motor; and operating the variable speed drive to provide an output voltage and frequency to the induction motor greater than the predetermined rated operational voltage and frequency of the induction motor, wherein powering the induction motor at an output voltage and frequency greater than the predetermined rated operational voltage and frequency results in the motor generating an output horsepower greater than the predetermined output horsepower. Claim 8 includes a system for increasing the output horsepower of a motor, the system comprising a motor having a predetermined rated operational voltage and frequency, and the motor being configured to generate a predetermined output horsepower in response to the predetermined rated operational voltage and frequency of the motor being input to the motor; a variable speed drive connected to the motor to power the motor, the variable speed drive being configured to provide a variable output voltage and variable output frequency to the motor, the

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variable output voltage and variable output frequency ranging between an output voltage and output frequency less than the predetermined rated operational voltage and frequency and an output voltage and output frequency greater than the predetermined rated operational voltage and frequency; and wherein operation of the motor at an output voltage and output frequency greater than the predetermined rated operational voltage and frequency results in the motor generating an output horsepower greater than the predetermined output horsepower.

The examiner is reminded that "'[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)." *See* Manual of Patent Examining Procedure, 8th Edition (MPEP) § 2131. In addition, "'[t]he identical invention must be shown in as complete detail as is contained in the ... claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." *See* Id.

Independent claims 1 and 8 recite several features that are not taught or suggested by Mukai. Mukai does not teach or suggest providing the motor with a voltage greater than the motor's rated voltage or providing the motor with a frequency above the motor's rated frequency as recited by Applicant in independent claims 1 and 8. Rather, Mukai teaches adjusting the voltage in the Volts/Hz ratio when the motor is operating at speeds less than the maximum rated speed of the motor. (*See* Mukai, Fig. 5 and Col. 6, Line 23-28). The Examiner asserts that Mukai discusses rated voltage for the motor in the abstract (*See* Office Action, page 2, par. 2), however, Applicant has not identified any passage in the abstract or elsewhere in Mukai that teaches or suggests that the motor has a rated voltage (or frequency) or that the motor receives a voltage greater than that rated voltage. As described above, the system in Mukai discusses producing a boosted voltage from the voltage level in the predetermined volts/Hz relationship. However, there is nothing in Mukai that remotely teaches or suggests that the "boosted" voltage would or could exceed a rated voltage for the motor. The Examiner is asked to specifically identify where in Mukai the rated voltage levels of the motor is taught or suggested and where a voltage greater than the rated level for the motor is taught or suggested. Since Mukai does not teach or suggest all of the limitations recited in independent claims 1 and 8, Applicant respectfully submits that Mukai does not anticipate Applicant's invention as recited in independent claims 1 and 8.

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Furthermore, dependant claims 2-7 and 9-17 are believed to be allowable as depending from allowable independent claims 1 and 8 for the reasons discussed above. In addition dependant claims 2-7 and 9-17 recite further limitations that distinguish over the applied art.

The features recited by Applicant in dependant claims 3, 9 and 10 are not taught or suggested by Mukai. In claims 3 and 10, Applicant recites a variable speed drive output that is at least twice the input voltage to the variable speed drive. In claim 9, Applicant recites providing an output voltage to the motor that is greater than the input voltage to the variable speed drive. Mukai does not teach or suggest these features but discusses a means of determining whether to boost the drive's output voltage above the current operating voltage or to retard the output voltage below the current output voltage based on the volts/Hz relationship with no discussion of the input voltage or how the output voltage relates to the input voltage. Further, Mukai's variable speed drive as shown in Figs. 1, 3 and 8 is composed of a passive diode rectifier converter, a DC link capacitor and a transistor inverter that cannot output a fundamental voltage level that is greater than 86.7% of the fundamental RMS input voltage to the variable speed drive when using standard modulation techniques, or 99.7% of the fundamental RMS input voltage when using third harmonic injection modulation. Thus, Mukai's output voltage levels cannot exceed the input voltage as recited by Applicant in claim 9, and are much less than twice the input voltage to the variable speed drive as recited by Applicant in claims 3 and 10. In addition, it is noted that boosting the voltage off of a volts/Hz curve as taught by Mukai is not the same as generating a voltage greater than the level of the line voltage. The Examiner is requested to identify the specific passage in Mukai that teaches or suggests Applicant's recited features. Since Mukai does not teach or suggest all of the limitations recited in dependant claims 3, 9 and 10, Applicant respectfully submits that Mukai does not anticipate Applicant's invention as recited in dependant claims 3, 9 and 10.

Mukai does not teach or suggest the features recited by Applicant in dependant claims 4, 7, 11 and 12. Applicant recites in claims 4, 7, 11 and 12 a predetermined rated operational voltage of the motor that is either equal to or less than the input voltage to the variable speed drive. As discussed above, Mukai does not discuss predetermined rated operational voltages for the motor, but recites varying the voltage levels of the motor on a comparison basis in response to predetermined reference angles. Further, the Examiner states that Mukai discloses boosting or lowering the output voltage of the variable speed drive of an input voltage to the variable speed

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drive. However, this reasoning does not address the relationship between the input voltage and the rated voltage for the motor in Mukai, which relationship Applicant submits is not present in Mukai. The Examiner is asked to specifically identify where in Mukai the relationship between the input voltage and the rated voltage is taught or suggested. Thus, since Mukai does not teach or suggest all of the limitations recited in dependant claims 4, 7, 11 and 12, Applicant respectfully submits that Mukai does not anticipate Applicant's inventions as recited in dependant claims 4, 7, 11 and 12.

In addition, the features recited by Applicant in dependant claims 5, 6, 13 and 14 are not taught or suggested by Mukai. In claims 5, 6, 13 and 14, Applicant recites a dual voltage motor having a high voltage connection and a low voltage connection, where the variable speed drive is connected to the low voltage connection of the dual voltage motor. The Examiner asserts that Mukai recites a dual voltage motor having a high voltage connection and a low voltage connection, citing to Mukai: Figures 1 and 3, abstract; column 6 lines 24-68, column 7 lines 1-68 and column 9 lines 5-32. However, Applicant has not identified any passage in the identified portions or elsewhere in Mukai that teaches or suggests a dual voltage motor having a high voltage connection and a low voltage connection. The Examiner is asked to specifically identify where in Mukai a dual voltage motor having a high voltage connection and a low voltage connection is taught or suggested. Since Mukai does not teach or suggest all of the limitations recited in dependant claims 5, 6, 13 and 14, Applicant respectfully submits that Mukai does not anticipate Applicant's inventions as recited in dependant claims 5, 6, 13 and 14.

Also, the features recited by Applicant in dependant claim 16 is not taught or suggested by Mukai. Claim 16 recites producing a voltage to the DC link greater than an input voltage to the variable speed drive. Mukai does not teach or suggest this feature, but rather discloses the use of a conventional three-phase passive diode bridge, which by definition cannot provide a DC link voltage to a DC link capacitor that is greater than the peak value of any one of three input line-to-line voltages. Since Mukai does not teach or suggest all of the limitations recited in dependant claim 16, Applicant respectfully submits that Mukai does not anticipate Applicant's inventions as recited in dependant claim 16.

In conclusion, it is respectfully submitted that independent claims 1 and 8 are not anticipated nor rendered obvious by Mukai. It is also respectfully submitted that dependant

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claims 2-7 and 9-17 are not anticipated nor rendered obvious by Mukai and are therefore allowable.

Rejection under 35 U.S.C. 103(a)

The Examiner rejected claims 18-23 under 35 U.S.C. § 103(a) as being unpatentable by Mukai et al. (U.S. Patent No. 5,010,287), hereafter referred to as "Mukai", in view of Norbeck (U.S. Patent No. 4,259,845), hereafter referred to as "Norbeck".

Specifically, the Examiner stated that

> Regarding Claim 18. Mukai discloses an induction motor control system that provides an induction motor (Figures 1 and 3 item 5) having a predetermined rated operational voltage and frequency, wherein the predetermined rated operational voltage and frequency of the motor provides a predetermined output horsepower (abstract), a converter/rectifier (Figures 1 and 3 item 1) and a DC link (Figures 1 and 3 item 3); providing a variable speed drive (Figure 1 item 20 and Figure 3 items 10 and 20) capable of outputting a voltage and frequency greater than the predetermined rated operational voltage and frequency of the motor (abstract; column 6 lines 24-68 and column 7 lines 1-68) and connecting the variable speed drive to the induction motor to provide power to the induction motor (Figures 1 and 3 item 5); and operating the variable speed drive to provide an output voltage and frequency to the induction motor greater than the predetermined rated operational voltage and frequency of the induction motor, wherein powering the induction motor at an output voltage and frequency greater than the predetermined rated operational voltage and frequency results in the motor generating an output horsepower greater than the predetermined output horsepower (abstract; column 6 lines 24-68, column 7 lines 1-68 and column 9 lines 5-32). However, Mukai does not disclose a compressor, a condenser and an evaporator connected in a closed refrigerant circuit.
>
> Norbeck discloses a logic control system for an inverter driven motor, which includes a compressor, a condenser and an evaporator connected in a closed refrigerant circuit (column 2 lines 1-10).
>
> It would have been obvious to one of ordinary skill in the art at the time of invention to use Mukai's an induction motor control system with Norbeck's a logic control system for an inverter driven motor. The advantage of combining the two would provide an inverter connected to drive an electric motor, which in turn drives a load. Further, the inverter provides AC energy over an output line to the motor upon receipt of DC energy over a DC bus.

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Applicants respectfully traverse the rejection of claims 18-23 under 35 U.S.C. § 103(a).

Mukai, as understood, is directed to a variable speed drive and control system composed of a passive diode rectifier, a DC link capacitor and an inverter composed of transistors. The device utilizes power factor detection to measure the power phase angle between the motor current and the inverter output voltage and uses this detected power factor to control the output of the motor.

Norbeck, as understood, is directed to a logic control system that regulates the frequency of operation of an inverter, which drives an electric motor, and regulates the level of the DC voltage supplied to the inverter. Further, Norbeck is directed toward a phase-controlled full converter that controls the DC link voltage of the inverter system to a level equal to or less than a conventional three-phase passive rectifier converter. The logic control system senses the levels of the voltage and the current supplied by the motor, and compares them to reference levels. The motor drives a compressor and a capacity control regulation that provides signals to the logic control system to assist in regulating operation of the inverter which drives the compressor. The logic control system also includes a reference conductor on which a basic reference control signal is developed for use in controlling both the amplitude and the frequency of the energy supplied by the inverter to the motor.

In contrast, Claim 18 recites a refrigeration system comprising a compressor, a condenser and an evaporator connected in a closed refrigerant circuit; a motor connected to the compressor to drive the compressor, the motor having a predetermined rated operational voltage and frequency, and the motor being configured to generate a predetermined output horsepower in response to the predetermined rated operational voltage and frequency of the motor being provided to the motor; a variable speed drive connected to the motor to power the motor, the variable speed drive being configured to provide a variable output voltage and variable output frequency to the motor, the variable output voltage and variable output frequency ranging between an output voltage and output frequency less than the predetermined rated operational voltage and frequency and an output voltage and output frequency greater than the predetermined rated operational voltage and frequency; and wherein operation of the motor at an output voltage and output frequency greater than the predetermined rated operational voltage and frequency results in the motor generating an output horsepower greater than the predetermined output horsepower.

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

See MPEP, Section 2143.03.

To begin, the Examiner asserts that Norbeck recites a logic control system for an inverter driven motor that when combined with Mukai's induction motor control system, yields the present invention to one skilled in the art. The Examiner maintains that one of ordinary skill in the art would combine Mukai's induction motor control system with Norbeck's logic control system for an inverter driven motor, which combination would then anticipate Applicant's invention. However, both Mukai and Norbeck fail to teach or suggest features recited by Applicant in claims 18-23. Therefore, in the event that one of ordinary skill in the art would combine Mukai and Norbeck, the result still would not anticipate the present invention.

Mukai in view of Norbeck does not teach or suggest providing the motor with a voltage greater than the motor's rated voltage or providing the motor with a frequency above the motor's rated frequency as recited by Applicant in independent claim 18. Mukai teaches adjusting the voltage in the Volts/Hz ratio when the motor is operating at speeds less than the maximum rated speed of the motor. (*See* Mukai, Fig. 5 and Col. 6, Line 23-28). The Examiner asserts that Mukai discusses rated voltage for the motor in the abstract (*See* Office Action, page 4), however, Applicant has not identified any passage in the abstract or elsewhere in Mukai that teaches or suggests that the motor has a rated voltage (or frequency) or that the motor receives a voltage greater than that rated voltage. As described above, the system in Mukai discusses producing a boosted voltage from the voltage level in the predetermined volts/Hz relationship. However, there is nothing in Mukai that remotely teaches or suggests that the "boosted" voltage would or could exceed a rated voltage for the motor. The Examiner is asked to specifically identify where in Mukai the rated voltage levels of the motor is taught or suggested and where a voltage greater than the rated level for the motor is taught or suggested. In addition, Norbeck does not teach or suggest the features of claim 18 that are missing from Mukai. Therefore, Applicant respectfully submits that Mukai in view of Norbeck does not anticipate Applicant's invention as recited in independent claim 18.

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In addition, Applicant submits that the Examiner has improperly combined Mukai and Norbeck because there is no motivation to combine Mukai with Norbeck to obtain Applicant's claimed invention. Furthermore, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art suggests the desirability of the combination." *See* MPEP, Section 2143.01.

The Examiner asserts that Mukai and Norbeck would be combined to provide an inverter connected to drive an electric motor, which in turn drives a load. However, this capability is already present in Mukai, thus one skilled in the art would not combine Mukai and Norbeck to obtain a capability already present in Mukai.

> In making the assessment of differences, section 103 specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698 [218 USPQ 865] (Fed. Cir. 1983) (noting that "virtually all [inventions] are combinations of old elements."). The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result – often the very definition of invention.
>
> Section 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. This court has provided further assurance of an "as a whole" assessment of the invention under §103 by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner. In other words, the examiner or court must show some suggestion or motivation, before the invention itself, to make the new combination. See In re Rouffet, 149 F.3d 1350, 1355-56 [47 USPQ2d 1453] (Fed. Cir. 1998).
>
> *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1276, 69 USPQ2d 1686, 1690 (Fed. Cir. 2004)

Thus, the Examiner has not providing a showing that one skilled in the art at the time of the invention would have selected elements from Mukai and Norbeck and combined them to attempt to anticipate Applicant's invention as recited in independent claim 18. Furthermore, dependant claims 19-23 are believed to be allowable as depending from allowable independent

claim 18 for the reasons discussed above. In addition, dependant claims 19-23 recite further limitations that distinguish over the applied art.

Several features recited by Applicant in dependant claims 19-23 are not taught or suggested by Mukai in view of Norbeck. Claims 19 and 20 are directed to a refrigeration system with motor output voltage levels that are higher than the input voltage to the variable speed drive. Applicant recites in dependant claim 19 a variable speed drive that provides an output voltage to the motor greater than an input voltage to the variable speed drive, and in claim 20, Applicant recites a refrigeration system with a motor output voltage that is at least twice the input voltage to the variable speed drive. Mukai in view of Norbeck does not teach or suggest these features but instead teaches in Mukai a means of determining whether to boost the drive's output voltage above the current operating voltage or to retard the output voltage below the current output voltage with no discussion of the input voltage or how the output voltage relates to the input voltage. Further, Mukai's variable speed drive as shown in Figs. 1, 3 and 8 is composed of a passive diode rectifier converter, a DC link capacitor and a transistor inverter that cannot output a fundamental voltage level that is greater than 86.7% of the fundamental RMS input voltage to the variable speed drive when using standard modulation techniques, or 99.7% of the fundamental RMS input voltage when using third harmonic injection modulation. Thus, Mukai's output voltage levels are less than the input voltage and much less than twice the input voltage to the variable speed drive as recited by Applicant in claims 19 and 20. Further, Norbeck does not teach or suggest a variable speed drive with a motor output voltage that is greater than the levels of input voltage to a variable speed drive. The Examiner is requested to identify the specific passage(s) in Mukai in view of Norbeck that teaches or suggests Applicant's claimed features. Since Mukai in view of Norbeck does not teach or suggest all of the limitations recited in dependant claims 19 and 20, Applicant respectfully submits that Mukai in view of Norbeck does not anticipate Applicant's inventions as recited in dependant claims 19 and 20.

Claims 21 and 22 are directed to a refrigeration system with predetermined rated operational voltages of the motor that are either equal to or less than the input voltage from the variable speed drive. Mukai does not teach or suggest predetermined operational voltages for the motor, but instead recites varying the voltage levels of the motor on a comparison basis in response to predetermined reference angles. In addition, Norbeck neither teaches nor suggests having a motor with predetermined rated operational voltage levels. Therefore, Mukai in view of

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Norbeck does not teach or suggest the features recited by applicant in claims 21 and 22, and Applicant respectfully submits that Mukai in view of Norbeck does not anticipate Applicant's inventions as recited in dependant claims 21 and 22.

Further, Mukai in view of Norbeck does not teach or suggest the features recited by Applicant in claim 23. Dependant claim 23 recites a refrigeration system wherein the motor has a stator insulation system rated for 600 VAC. The Examiner states "[the] motor is insulated". However, Applicant has not identified any passage in Mukai or Norbeck that discusses an insulated motor, and more specifically, an insulated motor rated for 600 VAC. The Examiner is requested to identify the specific passage in Mukai in view of Norbeck that teaches or suggests Applicant's claimed features. Since Mukai in view of Norbeck does not teach or suggest all of the limitations recited in dependant claim 23, Applicant respectfully submits that Mukai in view of Norbeck does not anticipate Applicant's inventions as recited in dependant claim 23.

In conclusion, it is respectfully submitted that independent claim 18 is not rendered obvious by Mukai in view of Norbeck. It is also respectfully submitted that dependant claims 19-23 are not rendered obvious by Mukai in view of Norbeck and are therefore allowable.

CONCLUSION

In view of the above, Applicant respectfully requests reconsideration of the Application and withdrawal of the outstanding objections and rejections. As a result of the remarks presented herein, Applicant respectfully submits that claims 1-23 are not anticipated by nor rendered unpatentable by Mukai, Norbeck or their combination, and thus are in condition for allowance. As the claims are not anticipated by nor rendered unpatentable in view of the applied art, Applicant requests allowance of claims 1-23 in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant.

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Application No. 10/789,632
Attorney Docket No. 20712-0061

The Commissioner is hereby authorized to charge any additional fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,
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